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Honors Bio II Final Outline

1. Foundation
2. How Does a Microarray work?
3. Works by exploiting the ability of a given mRNA molecule to hybridize to the DNA template that it originated from.
4. Can measure the amount of gene expression in cell by recording the amount of mRNA bonded to each DNA site on an array.
5. This amount of bonded mRNA is recorded with computer technology and a gene expression profile is set up.
6. Human Genome
7. Considered the complimentary partner to microarrays.
8. Human Genome is the knowledge and microarrays are the technology.
9. Without the human genome project microarrays would be dubbed useless.
10. Currently using microarrays to organize and catalog parts of the human genome.
11. Importance
12. Size and Capacity
13. Holds a very large number of genes
14. Can allow scientists to survey a large number of genes quickly with small samples
15. Can examine hundreds of thousands of genes at once
16. Used to study gene expression in single cells or even two different cells or tissue samples
17. Ex. Healthy cells vs. diseased cells.
18. Small in size
19. In the Near Future
20. Probable functions of new genes based on similarities in expression patterns to those of known genes
21. Promises to expand the size of the existing gene families, reveal new patterns of coordinating gene expression across families, and uncover completely new gene families.
22. Help identify the genes involved in viral development by allowing the study of viral genome with a much larger number of genes
23. Will also aid in examining the integration of gene expressions and function at cellular level.
24. How different genes work together
25. Multiple genes working to create one physical and chemical responses to cellular needs.
26. What is a Microarray?
27. Basic Microarray
28. Small, solid support onto which thousands of gene sequences attach or fix at a single location
29. Supports are usually glass microscope slides
30. Generally only as big as two pinky fingers side by side
31. Can also be silicon chips or nylon membranes
32. The DNA gets synthesized directly onto the support
33. Attachment of Gene sequence
34. Must be done in an orderly, fixed way because each spot is used to identify a particular gene sequence
35. DNA sequence
36. DNA
37. cDNA
38. Oligonucleotide- a short fragment of single stranded DNA, typically 5-50
39. Color scheme
40. Green
41. Represents control DNA
42. Where DNA or cDNA derived from normal tissue hybridized with the target DNA
43. Red
44. Represents sample DNA
45. Where DNA or cDNA derived from diseased tissue hybridized with the target DNA
46. Yellow
47. Represents a combination of both control and sample DNA
48. Both parts are equally hybridized to the target DNA
49. Black
50. Represents areas where neither control or sample DNA hybridized to the target DNA.
51. Color intensity
52. Will tell whether the gene or mutation is present in either the control or the sample DNA.
53. Provides an estimation of the expression level of the gene or genes in the sample and control DNA.
54. Changes in Gene Expression
55. Microarray Expression Analysis – determining the level, or volume, at which a certain gene is expressed.
56. Expression patterns – detection of whether a particular gene(s) is being expressed more or less under certain circumstances
57. Expression Chips
58. May be used to examine changes in gene expression over a given period of time.
59. Used to analyze microarray expression
60. Can be used to create certain drugs
61. Overexpressed genes can be located and tested to create a drug to reduce the overexpression
62. Can also be used in disease diagnosis
63. Used to identify new genes involved in environmentally triggered diseases such as diseases affecting the immune, nervous and pulmonary and respiratory systems.
64. Expression chips can be used to determine which genes have mutations causing cancerous cells to emerge.